

Newton's Laws Lesson Plan

8th grade Physical Science

SOLs:

PS. 10 The Student will investigate and understand scientific principles and technological applications of work, force, and motion. Key concepts include

- a) speed, velocity, and acceleration;
- b) Newton's Laws of motion;**
- c) work, force, mechanical advantage, efficiency, and power; and
- d) applications (simple machines, compound machines, powered vehicles, rockets, and restraining devices)

Objectives:

- Students will know Newton's three Laws of motion.
- Students will be able to give examples of each law in real life.
- Students will be able to use mass and acceleration to find the force on an object. (Apply $F=ma$)
- Students will understand the effects of friction on forces and motion.
- Students will be able to recognize/identify projectile motion.
- Students will know the equation and definition of momentum.

Materials:

- ActivInspire flipchart file
- Promethean clickers
- ActivHub
- Computer & hook up for a projector
- projector
- worksheet for taking notes
- Calculators (for students)

Introduction/Opening: (25 minutes)

- Discuss some questions from the exit slips from the day before. (7 minutes)
 - Their exit slip was to write an authentic question about Forces/Motion and I said I would pick a few to incorporate into my next lesson.
 - Most of the questions were going to be covered anyway
 - A lot of students had questions about how motion works in outer space.
- Clickers will be at each students' desk upon their arrival,
- Test questions to make sure they are all working. (3 minutes)

- Review of the day before. (15 minutes)
 - Clicker questions on velocity, distance, displacement, acceleration.
 - Go through the correct answers.

Body: (50 minutes)

Presentation on Newton's Laws

Students will be filling in the notes sheet during the presentation.

- Who is Isaac Newton?
- Newton's first Law
 - Law of Inertia
 - Examples- satellites orbiting earth, tablecloth 'magic'
 - Friction – the reason we don't see this in action
 - Friction can be a good thing: video of cars sliding on ice
- Newton's Second Law
 - $F=ma$
 - Examples- Force of gravity, difference between weight and mass.
 - Clicker questions on $F=ma$
 - Projectile motion
 - Motion in the x-direction is independent of motion in the y-direction
- Newton's Third Law
 - Action-reaction pairs
 - Examples – rockets; push against a wall, it pushes back
 - Video of Walle
 - Momentum – law of conservation of momentum
 - Collision clicker question
- (if time allows) Textbook questions on Newton's Laws

Conclusion: (15 minutes)

- Discussion of examples from the real world.
 - Where are Newton's Laws present in everyday life?
 - Expected answers:
 - Inertia: massive objects are harder to slow down and accelerate (cars)
 - $F=ma$: gravity, centripetal motion
 - Action/Re-action: any type of collision, firing a gun
 - Where are Newton's Laws present in movies/tv?
 - Expected/example answers:
 - Inertia: Speed: the bus won't stop
 - $F=ma$: Pirates of the Caribbean: when Will opens the prison doors
 - Action/Reaction: Walle, any rockets
 - How are Newton's Laws present in sports/games?
 - Expected answers:

- Inertia: curling
- $F=ma$: tug-o-war, sailing
- Action/Re-action: Bowling collisions, Billiards, any sport with a ball
- Why is understanding motion important?
 - Example: Large asteroids heading towards Earth
- Answering the exit slip questions not covered by the presentation.

Assessment:

Informal (formative assessment) - clicker questions throughout the lesson will inform me of the students progress and check of understanding.

Formal – the next day students will complete a webquest on sending a rocket into space.

- At the completion of the unit, students will have a test on forces and motion.